SCIENCE

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THE NEW METHOD OF PROTECTING BUILDINGS FROM LIGHTNING.

In this week's number we publish a letter on a case of lightning stroke, and would take occasion to suggest that it may help to clear up our ideas on these apparently erratic phenomena if we constantly bear in mind that the energy, just before a lightning flash, according to our present conceptions of electricity, exists in a more or less considerable mass of dielectric (the atmosphere and a portion of the earth), which includes the two points between which there is a difference of potential. In other words, if there is a difference of potential between a cloud and the earth the electrical energy exists diffused for the most part thoroughout a mass of air extending from the cloud to the earth, some, of course, existing in the surface layers of the earth. Now, when the flash takes place, all will agree that this energy manifests itself as light and heat, and in the knocking of things to pieces, perhaps.

We can but confuse our minds if we continue to think of the energy which causes the damage, or heat, or light, as coming from above or below, but should rather consider it as shrinking in, as it were, from all the circumambient dielectric to the places where it manifests itself as a heated line of air (the flash), or in the broken house-wall. The energy, which is what does the harm, comes, in the case of a vertical discharge not from above or below, but in the main horizontally. Do not let any one misunderstand me as saying that the electricity in such a case moves horizontally, for I do not. As I pointed out in my article in *Science* of April 8, I do not yet know of a case where the destruction, by the discharge, of a small conductor has failed to protect all else between two horizontal planes passing through the upper and lower ends of the dissipated conductor. It may be well to cite a few more cases of such protection resulting from the expenditure of the energy upon a small metallic conductor.

In the Philosophical Transactions, xlix., p. 298, is a paper read Dec. 18, 1755, by G. Brandir, Esq., descriptive of the striking of the Danish church in Wellclose Square, in which it is related that "on Monday, the 17th past, between six and seven o'clock, there was, among many others, one most amazing flash, accompanied with a clap of thunder, that equalled in report the largest cannon! That the next morning, observing the church clock to be silent, they went to the belfry, and found the wire and chain, that communicated from the clock in the belfry to the clapper in the turret, where the bells hang, to be melted; and that the small bar of iron from the clock, that gives motion to the chain and wire, just where the chain was fastened, was melted half through, the bar being about three-fourths of an inch broad, and half an inch thick. Several links of the chain, and of the wire, I have now the honor to shew you, where it will be observed, that the lightning took effect only in the joints. But whether it entered by communication from the wire exposed to the air in the small turret, through the roof of the belfry, or at the windows, there being several panes broke in the south and west corners, I cannot say; although I presume rather the first way, as it is very possible, that the bare report of the thunder might have occasioned the latter.

"The pieces of the wire and chain were scattered over the whole belfry, nor could it be discerned, that the wood-work, or aught else, had suffered."

There is a case cited in all the books on lightning, which is also interesting in this connection. The packet ship "New York" was struck by lightning April 19, 1827, while in the Gulf Stream. She was provided with a lightning rod, if it may be so called, consisting of a pointed iron rod one-half an inch in diameter and four feet long, at her mast-head, from which extended an iron chain, 130 feet long, to the sea. The links are described as one-quarter of an inch in diameter, whatever this may mean. It is evident, however, that the chain was not a heavy one and that, being a chain, it was a conductor of variable resistance, a condition well known to be conducive to destruction in case of the passage of a high-potential current. The rod was struck. A few inches of the terminal were melted, and of the chain all except three feet was dispersed. The important fact here as always, so far as yet known, is that no damage was done to the ship by the lightning.

My method of protecting buildings from lightning consists simply in placing on the building, from its highest to its lowest part, a small conductor of variable resistance, so as to make sure of its destruction in case the house is struck. And I base my confidence in its success on the fact that, exercising all possible diligence in the search through the records of actual cases of lightning stroke, I have not met with a case of failure of such a conductor to protect, when by accident it has been employed; and, further, I have failed to elicit any exceptions by the numerous methods of publi cation I have employed.

I employ one or two pounds of copper on a house of the ordinary size, and if anyone will take the trouble to calculate, according to the best data at our disposal, the energy dissipated in the evaporation of a pound of copper, he will understand how it is that there is none left to do further damage.

Another point which the records bring out, and which has been noted by others, is that damage occurs near large masses of metal. The small masses of metal, if not in confined spaces, burn as harmlessly as gunpowder on a sheeet of paper.

N. D. C. HODGES.

874 Broadway, New York.

SPANIARDS are making a good many preparations for the celebration of the four-hundredth anniversary of the discovery of the the New World. In the autumn of the present year, says *Nature*, there will be several exhibitions, in one of which will be shown objects relating to the continent of America before the advent of Europeans, while another will illustrate the state of civilization in the colonizing countries of the Old World at the time when the new continent was discovered. In October the Congress of Americanists will meet at Huelva, and will discuss a variety of subjects relating to the continent of America and its inhabitants 400 years ago. In the same month, at Madrid, a Spanish Portuguese-American Geographical Congress will meet for the discussion of such questions as relate more particularly to the "Iberian-American" races, their aptitude for colonization, and the future of the Spanish language.